

## CLAIMS

What is claimed is:

1. A method of designing one of a heat pump dehumidification system and an improved efficiency interior air heat exchange means for an operative heat pump system, which heat pump system is comprised of at least a refrigerant, refrigerant transport tubing, a compressor, interior heat exchange means, and exterior heat exchange means, comprising providing a first interior air heat exchange means to withdraw heat from the interior air, situated between the system's exterior heat exchange means and the system's compressor's refrigerant gas/vapor intake point, and providing a second interior air heat exchange means to reject heat into the interior air, situated between the system's compressor's refrigerant gas/vapor discharge point and the system's exterior heat exchange means.

2. The method of claim 1, where the system's first interior air heat exchange means, and not the system's second interior air heat exchange means, is operatively engaged during the system's cooling mode of operation.

3. The method of claim 2, where the system's second interior air heat exchange means is operatively disengaged in the cooling mode of operation by means of at least one of a solenoid valve and a check valve.

4. The method of claim 2, where at least one of the system's cooling mode of operation and the at least one of a solenoid valve and a check valve is controlled by at least one of a thermostat and a humidistat.

5. The method of claim 1, where the system's first interior air heat exchange means and the system's second interior air heat exchange means are both operatively engaged during the system's dehumidification mode of operation.

6. The method of claim 5, where the cooled interior air, provided by means of the first interior air heat exchange means, is mixed with the heated interior air, provided by means of the secondary interior air heat exchange means, for introduction into the interior air space.

7. The method of claim 5, where the system's second interior air heat exchange means is operatively engaged in the dehumidification mode of operation by means of at least one of a solenoid valve and a check valve.

8. The method of claim 5, where at least one of the system's dehumidification mode of operation and the at least one of a solenoid valve and a check valve is controlled by at least one of a humidistat and a thermostat.

9. The method of claim 4, where the system's humidistat's call for operation in the dehumidification mode is subject to, and will not override, the system's thermostat's call for operation in the cooling mode.

10. The method of claim 1, where the heat pump system is comprised of at least one of a direct expansion heat pump system, a water source heat pump system, and an air source heat pump system.

11. The method of claim 1, where the heat pump system's second interior air heat exchange means rejects heat into the interior air at a rate equal to the first interior air heat exchange means, less the rate equivalent to the additional heat of compression generated by means of the system's compressor.

12. The method of claim 1, where at least one of the system's cooling mode of operation and dehumidification mode of operation is controlled by at least one of a thermostat, a humidistat, and a thermostat/humidistat combination.

13. The method of claim 1, where both the first interior air heat exchange means and the second interior air heat exchange means are respectively comprised of an air handler.

14. The method of claim 13, where both respective air handlers are comprised of at least one of single speed air handlers, multi-speed air handlers, and variable speed air handlers, and where both respective air handlers simultaneously operate at one of a concurrent desired multiple cubic feet per minute airflow speed, less the rate in the second interior air heat exchange means that is equivalent to the additional heat of compression generated by means of at least one of the system's compressor and externally powered components.

15. The method of claim 13, where the heat pump system's compressor is at least one of a single speed compressor, a multiple speed compressor, and

a variable speed compressor, and where both respective air handlers operate at one of a concurrent desired lower speed when the compressor is operating at a lower speed, less the rate in the second interior air heat exchange means that is equivalent to the additional heat of compression generated by means of at least one of the system's compressor and externally powered components, and where both respective air handlers operate at one of a concurrent desired higher speed when the compressor is operating at a higher speed, less the rate in the second interior air heat exchange means that is equivalent to the additional heat of compression generated by means of at least one of the system's compressor and externally powered components.

16. The method of claim 13 where the first air handler's tonnage capacity is designed at a tonnage design capacity that is greater than the system's maximum compressor tonnage design capacity, and where the second air handler's tonnage capacity is designed at a tonnage design capacity that is one of equal to and less than the system's maximum compressor tonnage design capacity.

17. The method of claim 13 where the first air handler's tonnage capacity is designed at 200%, plus or minus 10% of 100%, of the system's maximum compressor tonnage design capacity, and where the second air handler's tonnage capacity is designed at 100%, plus or minus 10% of 100%, of the system's maximum compressor tonnage design capacity.

18. The method of claim 13 where the system's first air handler is one of by-passed, by means of a refrigerant transport tube, and is deactivated/disengaged, and is deactivated/disengaged by means of deactivating the first air handler's fan and reducing the first air handler's CFM airflow, while the system's second air handler is engaged and operative and the system is operating in the heating mode

19. A heat pump dehumidification system and an improved efficiency interior air heat exchange means for an operative heat pump system, which heat pump system is comprised of at least a refrigerant, refrigerant transport tubing, a compressor, interior heat exchange means, and exterior heat exchange means, comprising providing a first interior air heat exchange means to withdraw heat from the interior air, situated between the system's exterior heat exchange means and the system's compressor's refrigerant gas/vapor intake point, and providing a second interior air heat exchange means to reject heat into the interior air, situated between the system's compressor's refrigerant gas/vapor discharge point and the system's exterior heat exchange means.

20. The system of claim 19, where the system's first interior air heat exchange means, and not the system's second interior air heat exchange means, is operatively engaged during the system's cooling mode of operation.

21. The system of claim 20, where the system's second interior air heat exchange means is operatively disengaged in the cooling mode of operation by means of at least one of a solenoid valve and a check valve.

22. The system of claim 20, where at least one of the system's cooling mode of operation and the at least one of a solenoid valve and a check valve is controlled by at least one of a thermostat and a humidistat.

23. The system of claim 19, where the system's first interior air heat exchange means and the system's second interior air heat exchange means are both operatively engaged during the system's dehumidification mode of operation.

24. The system of claim 23, where the cooled interior air, provided by means of the first interior air heat exchange means, is mixed with the heated interior air, provided by means of the secondary interior air heat exchange means, for introduction into the interior air space.

25. The system of claim 23, where the system's second interior air heat exchange means is operatively engaged in the dehumidification mode of operation by means of at least one of a solenoid valve and a check valve.

26. The system of claim 23, where at least one of the system's dehumidification mode of operation and the at least one of a solenoid valve and a check valve is controlled by at least one of a humidistat and a thermostat.

27. The systems of claim 22, where the system's humidistat's call for operation in the dehumidification mode is subject to, and will not override, the system's thermostat's call for operation in the cooling mode.

28. The system of claim 19, where the heat pump system is comprised of at least one of a direct expansion heat pump system, a water source heat pump system, and an air source heat pump system.

29. The system of claim 19, where the heat pump system's second interior air heat exchange means rejects heat into the interior air at a rate equal to the first interior air heat exchange means, less the rate equivalent to the additional heat of compression generated by means of the system's compressor.

30. The system of claim 19, where at least one of the system's cooling mode of operation and dehumidification mode of operation is controlled by at least one of a thermostat, a humidistat, and a thermostat/humidistat combination.

31. The system of claim 19, where both the first interior air heat exchange means and the second interior air heat exchange means are respectively comprised of an air handler.

32. The system of claim 31, where both respective air handlers are comprised of at least one of single speed air handlers, multi-speed air handlers, and variable speed air handlers, and where both respective air handlers simultaneously operate at one of a concurrent desired multiple cubic

feet per minute airflow speed, less the rate in the second interior air heat exchange means that is equivalent to the additional heat of compression generated by means of at least one of the system's compressor and externally powered components.

33. The system of claim 31, where the heat pump system's compressor is at least one of a single speed compressor, a multiple speed compressor, and a variable speed compressor, and where both respective air handlers operate at one of a concurrent desired lower speed when the compressor is operating at a lower speed, less the rate in the second interior air heat exchange means that is equivalent to the additional heat of compression generated by means of at least one of the system's compressor and externally powered components, and where both respective air handlers operate at one of a concurrent desired higher speed when the compressor is operating at a higher speed, less the rate in the second interior air heat exchange means that is equivalent to the additional heat of compression generated by means of at least one of the system's compressor and externally powered components.

34. The system of claim 31 where the first air handler's tonnage capacity is designed at a tonnage design capacity that is greater than the system's maximum compressor tonnage design capacity, and where the second air handler's tonnage capacity is designed at a tonnage design capacity that is one of equal to and less than the system's maximum compressor tonnage design capacity.

35. The system of claim 31 where the first air handler's tonnage capacity is designed at 200%, plus or minus 10% of 100%, of the system's maximum compressor tonnage design capacity, and where the second air handler's tonnage capacity is designed at 100%, plus or minus 10% of 100%, of the system's maximum compressor tonnage design capacity.

36. The system of claim 31 where the system's first air handler is one of by-passed, by means of a refrigerant transport tube, and is deactivated/disengaged, and is deactivated/disengaged by means of deactivating the first air handler's fan and reducing the first air handler's CFM airflow, while the system's second air handler is engaged and operative and the system is operating in the heating mode

37. The method of claim 3, where at least one of the system's cooling mode of operation and the at least one of a solenoid valve and a check valve is controlled by at least one of a thermostat and a humidistat.

38. The method of claim 7, where at least one of the system's dehumidification mode of operation and the at least one of a solenoid valve and a check valve is controlled by at least one of a humidistat and a thermostat.

39. The method of claim 8, where the system's humidistat's call for operation in the dehumidification mode is subject to, and will not override, the system's thermostat's call for operation in the cooling mode.

40. The system of claim 21, where at least one of the system's cooling mode of operation and the at least one of a solenoid valve and a check valve is controlled by at least one of a thermostat and a humidistat.

41. The system of claim 25, where at least one of the system's dehumidification mode of operation and the at least one of a solenoid valve and a check valve is controlled by at least one of a humidistat and a thermostat.

42. The systems of claim 26, where the system's humidistat's call for operation in the dehumidification mode is subject to, and will not override, the system's thermostat's call for operation in the cooling mode.